PCI8100

User's Manual

Beijing ART Technology Development Co., Ltd.

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Chapter 1 Overview

In the fields of Real-time Signal Processing, Digital Image Processing and others, high-speed and high-precision data acquisition modules are demanded. ART PCI8100 data acquisition module, which brings in advantages of similar products that produced in china and other countries, is convenient for use and has low cost and stably high performance.

ART PCI8100 is an Arbitrary-waveform generator board based on PCI bus. It can be directly inserted into IBM-PC/AT or a computer which is compatible with PCI8100. It can be used as signal generating source in a variety of fields such as the laboratory, product quality testing center and so on.

Technical Characteristic

- 32 bit bus, support PCI2.2 protocol and achieve plug and play
- The design of FPGA Interface CMOS chip has the utmost confidentiality, especially suit OEM cooperation with our partners.

Unpacking Checklist

Check the shipping carton for any damage. If the shipping carton and contents are damaged, notify the local dealer or sales for a replacement. Retain the shipping carton and packing material for inspection by the dealer.
Check for the following items in the package. If there are any missing items, contact your local dealer or sales.

- PCI8100 Data Acquisition Board
- ART Disk
  a) user's manual (pdf)
  b) drive
  c) catalog
- Warranty Card

FEATURES

Analog Output

- Channel No.: 2-channel
- Output Range: -10~10V
- 12-bit resolution
- Sampling Rate: 1KS/s~40MS/s (software configurable)
- Analog Signals Bandwidth: 0~2MHz
- Trigger Mode: software trigger, hardware trigger
- Trigger Type: edge trigger, level trigger
- Trigger Direction: negative, positive, either positive or negative trigger
- Clock Source: External Clock, Internal Clock (software-configurable)
- Analog output Impedance: 1KΩ
- Data Transfer mode: programmed mode
- Operating Temperature Range: 0℃~55℃

- Storage Temperature Range: -20℃~70℃

Square-wave Output

- Channel No.: 1-channel
- Electric Standard: TTL compatible
- Maximum pull-down current: 20mA
- Maximum pull-up current: 2.6mA
- Input Voltage Range: high voltage≧2.4V, low voltage≦0.7V

Other features

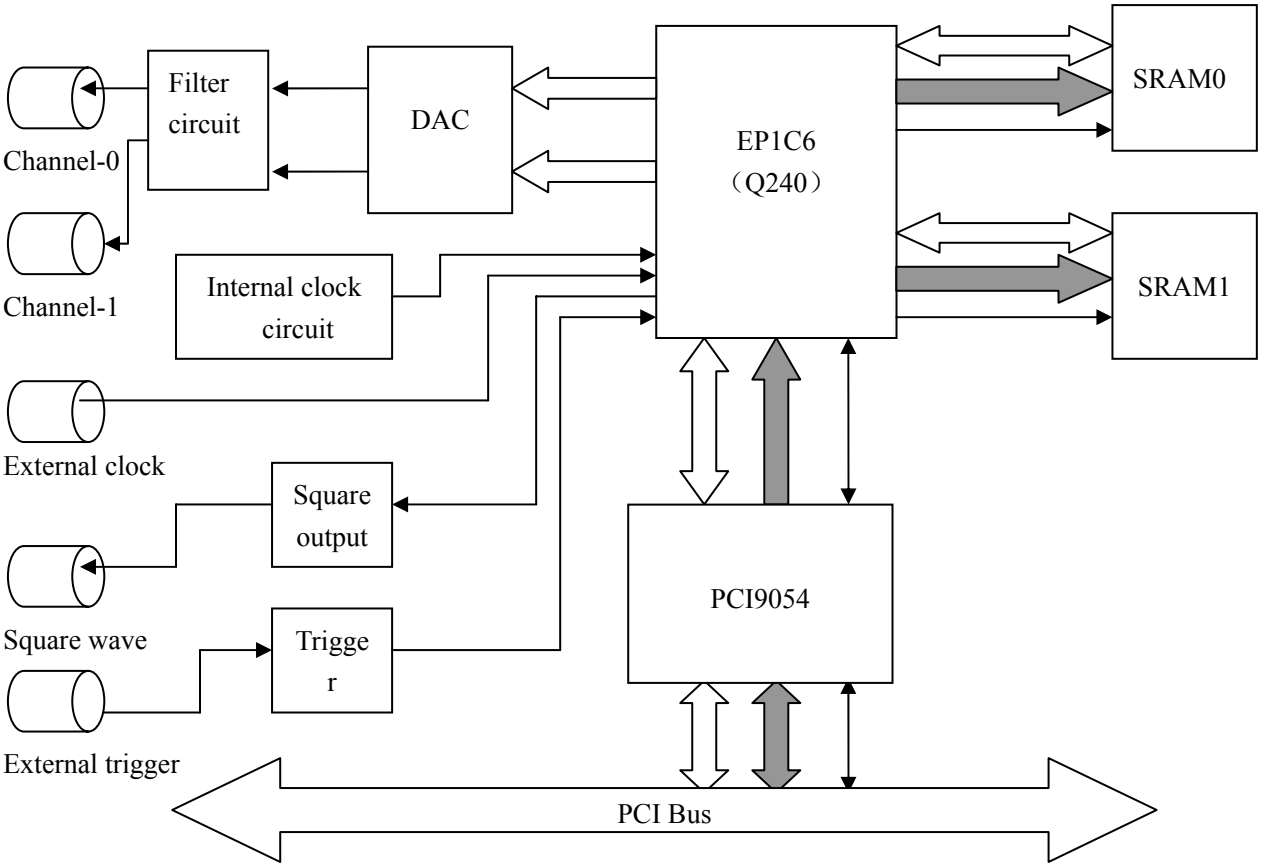
Board Clock Oscillation: 80MHz

Dimension

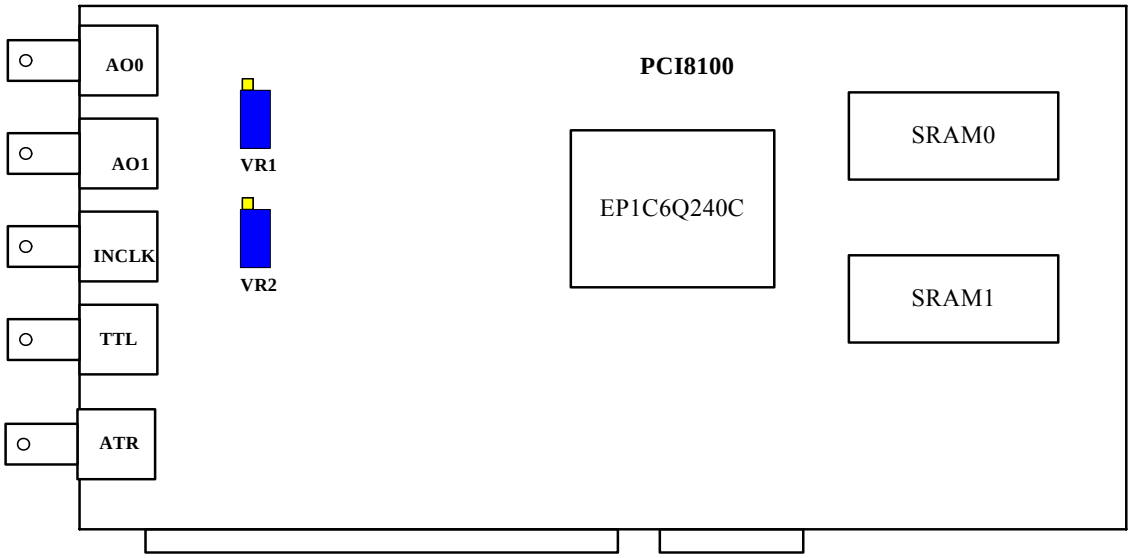
188mm (L) * 131mm (W) * 22mm (H)

Chapter 2 Components Layout Diagram and a Brief Description

2.1 Hardware Structure



2.2 The Main Component Layout Diagram



2.3 The Function Description for the Main Component

2.3.1 Signal Input and Output Connectors

AO0: analog output port 0.
AO1: analog output port 1.
ATR: external analog trigger signal input port.
TTL: square-wave output port
INCLK: external clock input port

2.3.2 Potentiometer

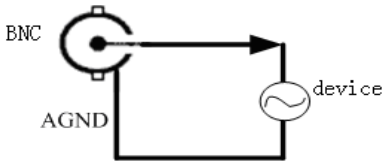
VR1: DA0 analog signal output full-scale point adjustment potentiometer
VR2: DA1 analog signal output full-scale point adjustment potentiometer

2.3.3 Reset button

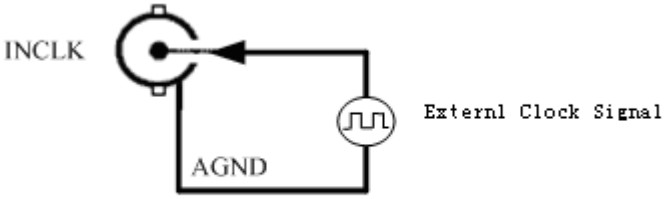
RST: the red hardware reset button (EP1C6), press EP1C6, and then the low-level makes the circuit board reset.

Chapter 3 Connection Ways for Each Signal

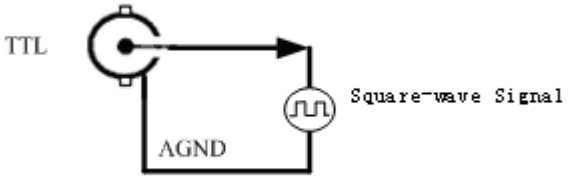
3.1 DA Analog Output Signal Connection



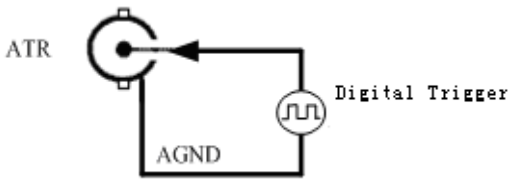
3.2 External Clock Signal Connection



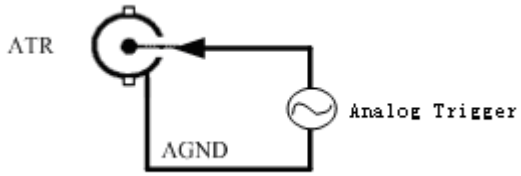
3.3 Square-wave Signal Connection



3.4 External Trigger Signal Connection (DTR)



3.5 External Trigger Signal Connection (ATR)



If use ART BNC down-lead to connect with output or input signals, please keep in mind that the red port is output/ input signals, the black port is ground.

Chapter 4 The Instruction of Trigger and Clock Functions

4.1 DA Trigger Function

4.1.1 DA Internal Trigger Mode

When DA is in the initialization, if the DA hardware parameter DAPara. TriggerMode = PCI8100_TRIGMODE_SOFT, we can achieve the internal trigger acquisition. In this function, when calling the StartDeviceDA function, it will generate DA start pulse, DA immediately access to the conversion process and not wait for the conditions of any other external hardware. It also can be interpreted as the software trigger.

As for the specific process, please see the figure below, the cycle of the DA work pulse is decided by the sampling frequency.

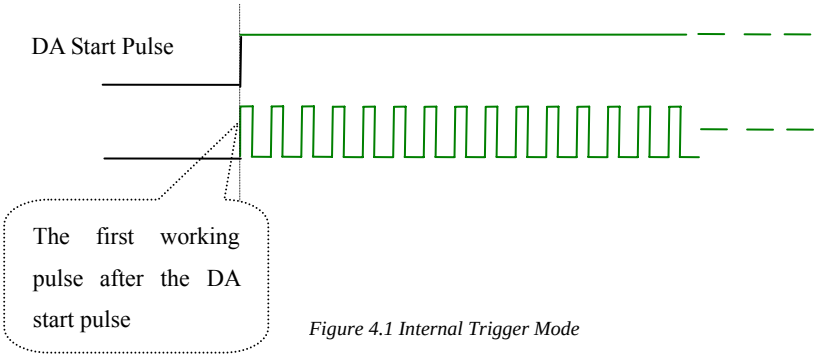


Figure 4.1 Internal Trigger Mode

4.1.2 DA External Trigger Mode

When DA is in the initialization, if the DA hardware parameter DAPara.TriggerMode = PCI8100_TRIGMODE_POST, we can achieve the external trigger acquisition. In this function, when calling the StartDeviceProDA function, DA will not immediately access to the conversion process but wait for the external trigger source signals accord with the condition, then start converting the data. It also can be interpreted as the hardware trigger. Trigger source is the DTR and ATR (Digital Trigger Source and Analog Trigger Source).

When the trigger signal is the digital signal (standard TTL-level), using the DTR trigger source. When the trigger signal is the analog signal, using the ATR trigger source. (Trigger level needs to be set when using the ATR trigger source)

DTR and ATR trigger principle are the same, the following is DTR trigger

DTR Trigger

When the trigger signal is the digital signal (standard TTL-level), using the DTR trigger source. There are two trigger types: edge trigger and pulse level trigger.

(1) Edge trigger function

Edge trigger is to capture the characteristics of the changes between the trigger source signal and the trigger level signal to trigger DA conversion.

When DAPara.TriggerDir = PCI8100_TRIGDIR_NEGATIVE, choose the trigger mode as the falling edge trigger. That is, when the DTR trigger signal is on the falling edge, DA will immediately access to the conversion process, and its follow-up changes have no effect on DA acquisition.

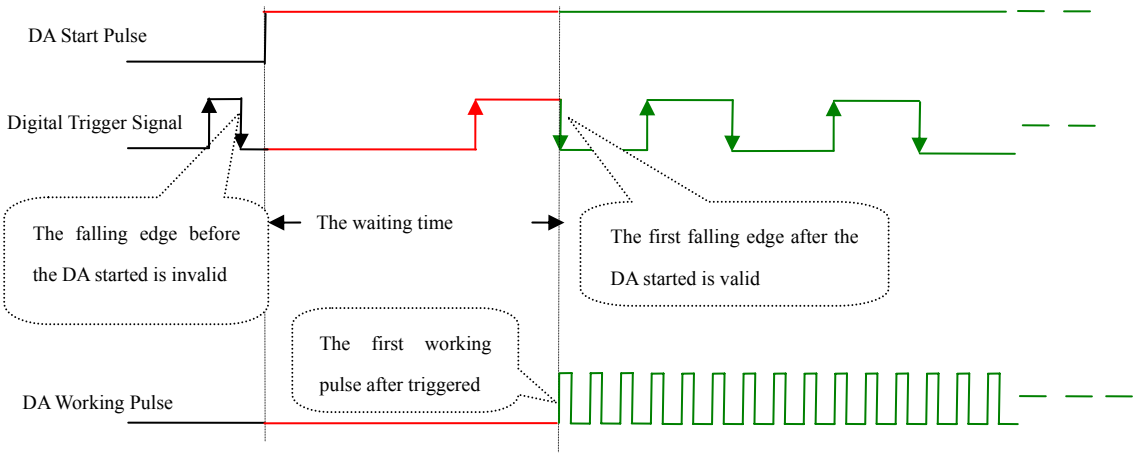

DA Start Pulse
Digital Trigger Signal
The falling edge before the DA started is invalid
The waiting time
The first falling edge after the DA started is valid
The first working pulse after triggered
DA Working Pulse

Figure 4.2 Falling edge Trigger

When DAPara.TriggerDir = PCI8100_TRIGDIR_POSITIVE, choose the trigger mode as rising edge trigger. That is, when the DTR trigger signal is on the rising edge, DA will immediately access to the conversion process, and its follow-up changes have no effect on DA acquisition.

When DAPara.TriggerDir = PCI8100_TRIGDIR_POSIT_NEGAT, choose the trigger mode as rising or falling edge trigger. That is, when the DTR trigger signal is on the rising or falling edge, DA will immediately access to the conversion process, and its follow-up changes have no effect on DA acquisition. This function can be used in the case that the acquisition will occur if the exoteric signal changes.

（2）Level trigger function

Level trigger is to capture the condition that trigger signal is higher or lower than the trigger level to trigger DA conversion.

When DAPara.TriggerDir = PCI8100_TRIGDIR_NEGATIVE, it means the trigger level is low. When DTR trigger signal is in low level, DA is in the conversion process, once the trigger signal is in the high level, DA conversion will automatically stop, when the trigger signal is in the low level again, DA will re-access to the conversion process that is, only converting the data when the trigger signal is in the low level.

When DAPara.TriggerDir = PCI8100_TRIGDIR_POSITIVE, it means the trigger level is high. When DTR trigger signal is in high level, DA is in the conversion process, once the trigger signal is in the low level, DA conversion will automatically stop, when the trigger signal is in the high level again, DA will re-access to the conversion process, that is, only converting the data when the trigger signal is in the high level.

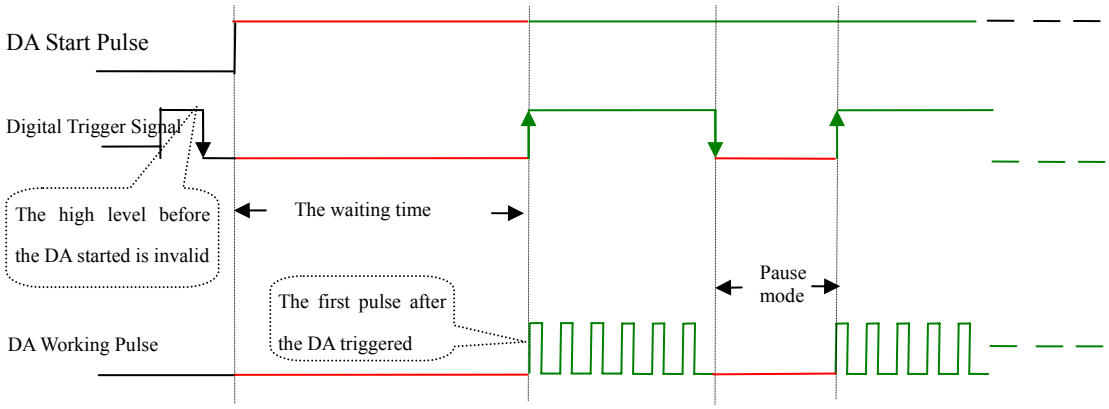

DA Start Pulse
Digital Trigger Signal
The high level before the DA started is invalid
The waiting time
Pause mode
The first pulse after the DA triggered
DA Working Pulse

Figure 4.3 High Level Trigger

WhenDAPara.TriggerDir = PCI8100_TRIGDIR_POSIT_NEGAT, it means the trigger level is low or high. The effect is the same as the internal software trigger.

4.2 Internal Clock Function of DA

Internal Clock Function refers to the use of clock signals which generated by on-board clock oscillator to trigger the DA conversion regularly. The clock of reading waveform data stored in SRAM is produced by the on-board logic control circuit according to user-specified frequency. The largest clock is the same as the frequency of triggering DA, and the smallest clock is 1/65535 of the frequency of triggering DA, this can achieve playback the waveform stored in SRAM slowly. To use the clock function, the hardware parameters DAPara.ClockSouce =PCI8100_CLOCKSRC_IN should be installed in the software. The frequency of the clock in the software depends on the hardware parameters. DAPara.Frequency. For example, if Frequency = 100000, that means AD work frequency is 100000Hz, but the refresh clock of DA does not change, it is still 40MHz.

4.3 External Clock Function of DA

External Clock Function refers to the use of the outside clock signals to trigger the DA conversion regularly. The clock signals are provide by the INCLK pin of the BNC connector. To use the external clock function, the hardware parameters DAPara.ClockSouce = PCI8100_CLOCKSRC_OUT should be installed in the software. The clock frequency depends on the frequency of the external clock, in the external clock mode, DA refresh clock and the clock of reading the waveform data are the same as the external clock.

Chapter 5 Notes, Calibration and Warranty Policy

5.1 Notes

In our products' packing, user can find a user manual, a PCI8100 module and a quality guarantee card. Users must keep quality guarantee card carefully, if the products have some problems and need repairing, please send products together with quality guarantee card to ART, we will provide good after-sale service and solve the problem as quickly as we can.

When using PCI8100, in order to prevent the IC (chip) from electrostatic harm, please do not touch IC (chip) in the front panel of PCI8100 module.

5.2 DA Analog Signal Output Calibration

Every device has to be calibrated before sending from the factory. It is necessary to calibrate the module again if users want to after using for a period of time or changing the input range. PCI8100 output range: ±10V.

1) Run ART Data Acquisition Measurement Suite in the WINDOWS. Select the D/A output test under the menu file operations, according to the channel which needs to be calibrated, select the appropriate manual single-point output.
2) Set the DA output to 4095, by adjusting the potentiometer VR1 and VR2 to make the D/A output +10V.

5.3 Warranty Policy

Thank you for choosing ART. To understand your rights and enjoy all the after-sales services we offer, please read the following carefully.

1. Before using ART products please read the user manual and follow the instructions exactly. When sending in damaged products for repair, please attach an RMA application form which can be downloaded from: www.art-control.com.

2. All ART products come with a limited two-year warranty:

- The warranty period starts on the day the product is shipped from ART factory
- For products containing storage devices (hard drives, flash cards, etc.), please back up your data before sending them for repair. ART is not responsible for any loss of data.
- Please ensure the use of properly licensed software with our systems. ART does not condone the use of pirated software and will not service systems using such software. ART will not be held legally responsible for products shipped with unlicensed software installed by the user.

3. Our repair service is not covered by ART guarantee in the following situations:

- Damage caused by not following instructions in the User's Manual.
- Damage caused by carelessness on the user's part during product transportation.
- Damage caused by unsuitable storage environments (i.e. high temperatures, high humidity, or volatile chemicals).
- Damage from improper repair by unauthorized ART technicians.
- Products with altered and/or damaged serial numbers are not entitled to our service.

4. Customers are responsible for shipping costs to transport damaged products to our company or sales office.

5. To ensure the speed and quality of product repair, please download an RMA application form from our company website.

Products Rapid Installation and Self-check

Rapid Installation

Product-driven procedure is the operating system adaptive installation mode. After inserting the disc, you can select the appropriate board type on the pop-up interface, click the button【driver installation】; or select CD-ROM drive in Resource Explorer, locate the product catalog and enter into the APP folder, and implement Setup.exe file. After the installation, pop-up CD-ROM, shut off your computer, insert the PCI card. If it is a USB product, it can be directly inserted into the device. When the system prompts that it finds a new hardware, you do not specify a drive path, the operating system can automatically look up it from the system directory, and then you can complete the installation.

Self-check

At this moment, there should be installation information of the installed device in the Device Manager (when the device does not work, you can check this item.). Open "Start -> Programs -> ART Demonstration Monitoring and Control System -> Corresponding Board -> Advanced Testing Presentation System", the program is a standard testing procedure. Based on the specification of Pin definition, connect the signal acquisition data and test whether AD is normal or not. Connect the input pins to the corresponding output pins and use the testing procedure to test whether the switch is normal or not.

Delete Wrong Installation

When you select the wrong drive, or viruses lead to driver error, you can carry out the following operations: In Resource Explorer, open CD-ROM drive, run Others-> SUPPORT-> PCI.bat procedures, and delete the hardware information that relevant to our boards, and then carry out the process of section I all over again, we can complete the new installation.